1.1 Radio Astronomy

1.1.1 Maintenance and Calibration

- MarkIV VLBI recorders maintenance: performed a successful recording test on Recorder#2.
- Mark5 recorder#2 backplane board has been replaced by a spare.
- 5 MHz reference from FTS100 was injected to K-band phase calibration unit at DSS-63.
- In preparation to support the Multi-Frequency Synthesis (MFS) VLBI test, K-band noise diode temperature was measured for each frequency setup (DSS-63, ATOT development, 240min) and Field System rxg file was updated with new values. Experiment files were generated for participating stations.

1.1.2 Training courses

Several real-time training courses on VLBI Operations were imparted by the RA Engineer to MDSCC on-duty VLBI operator.

1.1.3 Research & Development

We are currently involved in testing the Multi-Frequency Synthesis (MFS) VLBI technique, in collaboration with ATOT JPL office, GDSCC, the Astro Space Center (Moscow) and MPIfR (Bonn). These tests are in preparation for the RadioAstron Space VLBI mission. The usage of MFS mode will allow filling in the u-v plane during the mission's common mode of observing that will include only a few large ground antennas and the high-orbit spacecraft. The DSN wide-band K-band receivers are very appropriate to test and carry out MFS observations.

1.1.4 Observations

1.1.4.1 Host Country Spectroscopy

During this month spectroscopy observations with DSS-63 antenna were carried out using the SPB500 spectrometer and the MarkIV data acquisition terminal. Following Host Country projects were performed with DSS-63:

- **D63-S01:** study of CCS molecule (22.334 GHz) extended emission in young low-mass protostars. Frequency switching mode was used.

- **D63-S08:** study of ammonia emission in a sample of LBV nebulae.

DOY	minutes scheduled	minutes used	percent good data	Activity	comments
062	365	280	20	"GBRA H/C D63-S01/S08"	s/w problems

1.1.4.2 Interferometry

MDSCC participated in 5 Very Long Baseline Interferometric (VLBI) observations (2525 min in total):

- RFC Clock Synchronization on DSS-65 (2 observations; 550 min): For first observation S-band phase calibration tones amplitude set too high. For second observation 100% data collected, performance of system nominal.

- RFC Cat X/Ka on DSS-55 (1 observation; 1115 min): observation cancelled due to a problem with predicts provided by the PI.

- European VLBI Network (EGS project) on DSS-63 (1 observation; 435 min): 100% data collected, performance of system nominal. No problems experienced with Mark5 recorder (512Mbps). System temperature file was derived using *antabfs* application and sent to EVN archive.

- ATOT development MFS test on DSS-63 (1 observation; 425 min): This test was performed with DSS-14 and DSS-63. In general the test was successful in both stations, except from a polarization configuration problem found at MDSCC during first recording hour. Also at DSS-63 there was not K-band phase calibration tones available. No problems experienced with Mark5 recorder (512Mbps). System temperature files were derived for both stations using *antabfs* application and sent to EVN archive.